



ANAT2004

Neuroanatomy

Session 2, Weekday attendance, North Ryde 2020

Department of Chiropractic

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Disclaimer

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.

Notice

As part of [Phase 3 of our return to campus plan](#), most units will now run tutorials, seminars and other small group learning activities on campus for the second half-year, while keeping an online version available for those students unable to return or those who choose to continue their studies online.

To check the availability of face-to-face and online activities for your unit, please go to [timetable viewer](#). To check detailed information on unit assessments visit your unit's iLearn space or consult your unit convenor.

General Information

Unit convenor and teaching staff
convenor

Stephney Whillier

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Contact via 9850 9387

17WW 356

By request

Credit points

10

Prerequisites

HLTH108 or ANAT1001 or COGS1000

Corequisites

Co-badged status

Unit description

This unit builds on the basic anatomy taught in ANAT1001. It focuses on the structure and function of the nervous system. The unit utilises an integrated approach within which relevant gross anatomy, histology and embryology, as well as clinical and applied anatomy are incorporated.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

Learning Outcomes

On successful completion of this unit, you will be able to:

ULO1: Describe in detail the organisation, structure and interconnected function of the nervous system, including the cerebral cortex, brainstem, diencephalon, cerebellum, basal ganglia, limbic system, spinal cord, cranial and spinal nerves. This includes demonstrated knowledge of the meninges, ventricular system, blood supply and main histological features of the tissues.

ULO2: Relate your structural knowledge of the nervous system to its embryological development.

ULO3: Trace somatic and autonomic sensory inputs (from receptor to cortex, via brainstem and thalamus) and motor outputs (from motor cortex to effector organ, including the inputs from the basal ganglia and cerebellum). This includes outlining the specific ascending and descending pathways, and the pathways for taste, smell, hearing, balance, and vision

ULO4: Extend your acquired knowledge of neuroanatomy to discuss, evaluate and interpret clinical case studies and published research.

ULO5: Show that you are competent in analysing, interpreting and assessing relevant anatomical structures on images, photographs, bones, models, prosections, normal radiographs, MRI and CT scans.

ULO6: Show an appreciation and respect for those who have bequeathed their bodies to research

General Assessment Information

Assessment Tasks Description

1. Nine (9) quizzes: 10 minute quizzes to be completed online in WEEKS 3, 4, 5, 6, 7, 9, 10, 11, 12 that will test **lecture** material of the previous week/s. See the schedule above for details on content that is covered by looking at the previous week's lecture content.

The format will be multiple choice questions or fill in the missing word/s. Each quiz will open on Monday at 8am and close on Sunday at 11pm. The first quiz will be posted on Monday of week 3. There will be absolutely no opportunity to submit a quiz after the closing time as answers are released at that point. If you have technical difficulties, email your answers to your convenor and they will be manually marked. If you email these after the closing time, they will not be marked. The quizzes will have a time limit of 10 minutes, and there will be only one submission per student.

The resultant mark will be an **AVERAGE of the 9 quiz marks (please note, NOT best x of 9)**.

2. Assignment Presentation: There are no practicals in week 6. Instead, students are expected to submit their individual three (3) minute audiovisual presentations on iLearn via Turnitin. Online submission is open from Monday 31 August at 8AM to Friday 4 September at 5PM.

Pretend that you are providing a short video for a newscast as an exciting science/medical snippet.

The subject of the presentation is a science/medical media article (written not video) you have found that relates to neuroanatomy, or a pathology/disease associated with the nervous system. It must be recent i.e. 2018 – 2020. You will turn it into an audiovisual presentation for the general

public.

The following questions must be answered:

1. What is the latest finding? Explain what has been discovered
2. What is the relevant neuroanatomy associated with this finding? Discuss and explain the anatomy
3. What are the implications of this finding for neuroanatomy/neuropathology?

- It is essential that the article chosen comes from a reputable site. If possible, find the original paper that was published in a journal (the media article usually gives the reference)
- The presentation **must be** 3 minutes long. 2% will be deducted for every minute over this.
- You can present the information in any way you like – powerpoint, models, pictures, graphics, talking head – or combinations of all forms. Be as creative as you like.
- Use Macquarie University Zoom to record your presentation. You **must** go through the Macquarie University portal: zoom.us/join. Register by using your Macquarie University email address and password. Simply record your presentation and upload the mp4 file sent to you to Turnitin
- Please see the rubric for this assignment in the neuroanatomy manual, It will give you guidance on how you will be marked.
- Note that this is not group work, but is an individually done assessment

3. Final examination: This will cover the content of the entire semester. It tests knowledge of the theory, and the ability to connect that knowledge to real life situations (e.g. case studies). It will consist of a 2 hour written exam with multiple choice questions and short answer questions.

4. Practical test: All identification activities conducted during the practical class are examinable, and include identifying structures on images, bones, models, prosections, radiographs, MRI and CT images. A written examination.

Examinations

The University Examination period in for Semester 2 is from the 9 – 27 November, 2020. You are

expected to present yourself for examination at the time and place designated in the University examination timetable. The timetable will be available in draft form approximately eight weeks before the commencement of the examinations and in final form approximately four weeks before the commencement of the examinations: <http://www.timetables.mq.edu.au/exam>

The only exception to not sitting an examination at the designated time is because of documented illness or unavoidable disruption. In these circumstances you may wish to consider applying for special consideration. The University's Special Consideration Policy can be found at <https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policies/special-consideration>. Information can also be found at <https://students.mq.edu.au/study/my-study-program/special-consideration>

Students with a pre-existing disability/health condition or prolonged adverse circumstances may be eligible for ongoing assistance and support. Such support is governed by other policies and may be sought and coordinated through [Campus Wellbeing and Support Services](#).

If a supplementary examination is granted as a result of special consideration, the examination will be scheduled after the conclusion of the official examination period.

If you receive [special consideration](#) for the final exam, a supplementary exam will be scheduled in the interval between the regular exam period and the start of the next session. By making a special consideration application for the final exam you are declaring yourself available for a resit during the supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the [policy](#) prior to submitting an application. You can check the supplementary exam information page on FSE101 in iLearn (bit.ly/FSESupp) for dates, and approved applicants will receive an individual notification one week prior to the exam with the exact date and time of their supplementary examination.

You are advised that it is Macquarie University policy not to set early examinations for individuals or groups of students. You are expected to ensure that you are available until the end of the teaching semester that is the final day of the official examination period.

Returning Assessment Tasks

1. Quizzes: Feedback is on closure of the quiz for that week.
2. Audiovisual assignment: feedback is online as the rubric will be uploaded to Turnitin which will allow you to see the mark breakdown and comments.
2. Practical exam: Papers will not be returned but marks will be given out prior to the final theory exam.
3. Examination: Papers will not be returned. Marks will be made available on iLearn.

Extensions and penalties

Extensions to assignments are at the discretion of the unit convenor. It is the responsibility of the student to prove to the convenor that there has been unavoidable disruption. Marks will be deducted for late submissions in the absence of an approved extension.

Assessment Tasks

Name	Weighting	Hurdle	Due
<u>Tutorial quizzes</u>	20%	No	Weeks 3-7, 9, 10 - 12
<u>Practical Spot Exam</u>	20%	No	Week 12
<u>Final Theory Examination</u>	40%	No	examination period
<u>Presentation of a neuroscience media alert</u>	20%	No	Week 6, from 31 August - 4 September

Tutorial quizzes

Assessment Type ¹: Quiz/Test

Indicative Time on Task ²: 20 hours

Due: **Weeks 3-7, 9, 10 - 12**

Weighting: **20%**

10 minute quizzes held at the start of tutorials.

On successful completion you will be able to:

- Describe in detail the organisation, structure and interconnected function of the nervous system, including the cerebral cortex, brainstem, diencephalon, cerebellum, basal ganglia, limbic system, spinal cord, cranial and spinal nerves. This includes demonstrated knowledge of the meninges, ventricular system, blood supply and main histological features of the tissues.
- Relate your structural knowledge of the nervous system to its embryological development.
- Trace somatic and autonomic sensory inputs (from receptor to cortex, via brainstem and thalamus) and motor outputs (from motor cortex to effector organ, including the inputs from the basal ganglia and cerebellum). This includes outlining the specific ascending and descending pathways, and the pathways for taste, smell, hearing, balance, and vision

- Extend your acquired knowledge of neuroanatomy to discuss, evaluate and interpret clinical case studies and published research.

Practical Spot Exam

Assessment Type ¹: Examination

Indicative Time on Task ²: 10 hours

Due: **Week 12**

Weighting: **20%**

Practical examination assessing knowledge of the nervous system by identifying structures on models, prosections, images, bones, radiographs, MRI and CT images. A written examination.

On successful completion you will be able to:

- Describe in detail the organisation, structure and interconnected function of the nervous system, including the cerebral cortex, brainstem, diencephalon, cerebellum, basal ganglia, limbic system, spinal cord, cranial and spinal nerves. This includes demonstrated knowledge of the meninges, ventricular system, blood supply and main histological features of the tissues.
- Show that you are competent in analysing, interpreting and assessing relevant anatomical structures on images, photographs, bones, models, prosections, normal radiographs, MRI and CT scans.
- Show an appreciation and respect for those who have bequeathed their bodies to research

Final Theory Examination

Assessment Type ¹: Examination

Indicative Time on Task ²: 35 hours

Due: **examination period**

Weighting: **40%**

This will cover the content of the entire semester. It tests knowledge of the theory, and the ability to connect that knowledge to real life situations (e.g. case studies). It will consist of a 2 hour written exam with multiple choice questions and short answer questions.

On successful completion you will be able to:

- Describe in detail the organisation, structure and interconnected function of the nervous system, including the cerebral cortex, brainstem, diencephalon, cerebellum, basal ganglia, limbic system, spinal cord, cranial and spinal nerves. This includes demonstrated knowledge of the meninges, ventricular system, blood supply and main histological features of the tissues.
- Relate your structural knowledge of the nervous system to its embryological development.
- Trace somatic and autonomic sensory inputs (from receptor to cortex, via brainstem and thalamus) and motor outputs (from motor cortex to effector organ, including the inputs from the basal ganglia and cerebellum). This includes outlining the specific ascending and descending pathways, and the pathways for taste, smell, hearing, balance, and vision
- Extend your acquired knowledge of neuroanatomy to discuss, evaluate and interpret clinical case studies and published research.

Presentation of a neuroscience media alert

Assessment Type ¹: Presentation

Indicative Time on Task ²: 10 hours

Due: **Week 6, from 31 August - 4 September**

Weighting: **20%**

Group presentation of a science/medical media alert that relates to neuroanatomy, or a pathology/disease associated with the nervous system.

On successful completion you will be able to:

- Describe in detail the organisation, structure and interconnected function of the nervous system, including the cerebral cortex, brainstem, diencephalon, cerebellum, basal ganglia, limbic system, spinal cord, cranial and spinal nerves. This includes demonstrated knowledge of the meninges, ventricular system, blood supply and main histological features of the tissues.
- Extend your acquired knowledge of neuroanatomy to discuss, evaluate and interpret clinical case studies and published research.
- Show that you are competent in analysing, interpreting and assessing relevant anatomical structures on images, photographs, bones, models, prosections, normal radiographs, MRI and CT scans.

¹ If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the [Writing Centre](#) for academic skills support.

² Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

Delivery and Resources

Delivery mode

This unit is characterised by a moderate degree of flexibility. It incorporates a variety of learning tools and media. It will comprise:

1. 1 × 2h lecture and 1 × 1 hour lecture per week, weeks 1 - 12
2. 1 × 1.5 hour laboratory practical class per week, weeks 2 - 12: Students must register for a practical slot on e-student
3. 1 × 1 hour tutorial class per week, weeks 2 - 13: Students must register for a tutorial slot on e-student
4. 2 – 3 hours per week revision, completing the weekly Revision tasks in the laboratory manual, preparing for the laboratory practical and tutorial, self-instructional learning and readings from the text.

Class times and locations

1. Online Lectures: Monday 8-9AM, and Friday 8-10AM
2. On campus Practicals: *Choose **one** of the following:* Monday 9-10:30am, 11-12:30pm, 1-2:30pm, 3-4:30pm, 5-6:30pm, and Wednesday 9-10:30am, 11:30-1pm in Anatomy Lab
3. On campus Tutorials: *Choose **one** of the following:* Thursday 11-12am, 12-1pm, 1-2pm, 2-3pm, 3-4pm (last one is online)

Attendance Requirements

You must attend the practical and tutorial class in which you enrolled. Students must not exchange their class time. If you miss your assigned practical or tutorial in any week, you may request attendance at an alternative session, through email request and appropriate documentation to the unit convenor. This allowance may be used on a maximum of 2 occasions.

Attendance is taken at each practical and tutorial. If you miss more than 2 sessions without emailing the unit convenor to explain why, you will be asked to come in to discuss your progress.

Unit Web Page

You can log in to iLearn System through <http://learn.mq.edu.au>

All lectures materials will be posted on iLearn. The Audiovisual recording will be available on ECHO on iLearn.

Required and recommended resources

Required:

- Haines, DE (2015) *Neuroanatomy, An Atlas of Structures, Sections, and Systems*. 9th ed. Wolters Kluwer/Lippincott Williams & Wilkins
- ANAT2004 *Laboratory Course Manual* – available as a download on iLearn

Recommended:

- Krebs C, Weinberg J and Akesson E (2012) Lippincott's Illustrated Reviews Neuroscience Harvey RA (series editor) Wolters Kluwer LWW
- Kiernan, JA (2009) *Barr's The Human Nervous System An Anatomical Viewpoint*. 9th ed. Wolters Kluwer/Lippincott Williams & Wilkins, PA
- Blumenfeld H (2002) *Neuroanatomy through Clinical Cases*. Sinauer Associates Inc, Massachusetts.

Websites:

An excellent website for anatomy is now available on our Macquarie University library website. Go to Databases, choose the subject 'Chiropractic' and click on 'Anatomy.tv' for **Wolterskluwer Ovid Primal Pictures Interactive Anatomy**

Unit Schedule

The content is divided into 14 topics. Some topics include a few selected associated pathologies for discussion

Topic 1: Overview

- The overall organisation of the nervous system (central and peripheral), overall

anatomical structure, histology and nomenclature

Topic 2: Spinal cord

- The detailed gross anatomy and cross-sectional structure of the spinal cord, with an emphasis on the fibre tracts
- Blood supply of spinal cord

Topic 3: Ontogeny

- Overview of the embryological development of the CNS

Topic 4: Cerebral cortex and cerebrum

- The detailed anatomical structure (surface, sagittal and coronal), and associated function of the cortex, including selected Brodmann areas
- Arterial and venous blood supply of the brain

Topic 5: Limbic System

- Limbic system structure and function

Topic 6: Diencephalon

- The detailed divisions and structures, boundaries, and functions, with emphasis on the thalamus as the gateway of the cerebral cortex and the multiple functions of the hypothalamus

Topic 7: Basal ganglia

- Classification, detailed structure, position and role in modifying motor control

Topic 8: Brainstem

- The divisions, detailed anatomy and function of the brainstem as a conduit, centre of most cranial nerve nuclei, and integrator of information
- The reticular formation
- Cranial nerves

Topic 9: Special sensory pathways

- Identification of the neurological pathways of the special senses viz vision, hearing, balance, olfaction and taste

Topic 10: Cerebellum

- Detailed gross anatomy, general microanatomy, multiple inputs and functional circuitry

Topic 11: Peripheral nervous system: plexuses and peripheral nerves

- The structure of plexuses, emerging peripheral nerves and their sensory and motor functions
- The stretch reflex
- Differentiation of upper motor and lower motor neuron lesions

Topic 12: Autonomic nervous system

- Classification, gross architecture, anatomy and function of the sensory afferent and motor efferent (sympathetic and parasympathetic divisions) of the autonomic nervous system

Topic 13: Somatosensory pathways

- Trace ascending pathways from receptors to final central destination

Topic 14: Motor pathways

- Trace pyramidal and extrapyramidal descending pathways, and the role of the basal ganglia and cerebellum in the planning and monitoring of movements

Timetable for Lectures, Practicals and Tutorials

Date	Monday (1h) & Friday (2h): ONLINE LECTURES	Monday or Wednesday: On CAMPUS PRACTICALS (1.5 hour)	Thursday: ON CAMPUS TUTORIALS (1 hour)

Week 1 Monday, July 27	Overview of nervous system Overview of the spinal cord and blood supply	None	None
Week 2 Monday, August 3	Ontogeny Cerebral cortex and blood supply	Spinal Cord and blood supply	Group work on Organisation of the Nervous System Case study on spinal cord
Week 3 Monday, August 10	Diencephalon and Internal Capsule Limbic system	overview of cerebral cortex, and blood supply	Cerebral Cortex Activity and Case Study Ontogeny Activity
Week 4 Monday, August 17	Basal ganglia	Diencephalon, Internal Capsule and limbic system	Internal capsule activity Case study on Thalamus
Week 5 Monday, August 24	Brainstem	Basal ganglia	Group work and case study on basal ganglia
Week 6 Monday, August 31	Cranial Nerves	Online presentation uploads – no practical	Brainstem discussion and case study
Week 7 Monday, September 7	Special senses	Brainstem and Cranial Nerves	Discussion and case study on cranial nerves
September 14 – 27 MIDSEMESTER BREAK			
Week 8 Monday, September 28	Cerebellum	Special Senses	Radiology
Week 9 Tuesday, October 5	plexuses and peripheral nerves	Labour Day – no practicals	Case studies on special senses and cerebellum
Week 10 Monday, October 12	ANS	Cerebellum, Plexuses and peripheral nerves	Group work and case study on peripheral nerves
Week 11 Monday, October 19	Sensory afferent pathways	ANS and Revision	Case studies on ANS
Week 12 Monday, October 26	Motor efferent pathways	Practical Spot Test	Sensory afferent pathways activities
Week 13 Monday, Nov 2	None	None	Activity and case study on motor pathways

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central) (<https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central>). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Grade Appeal Policy](#)
- [Complaint Management Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#) (**Note:** *The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.*)

Students seeking more policy resources can visit the [Student Policy Gateway](https://students.mq.edu.au/support/study/student-policy-gateway) (<https://students.mq.edu.au/support/study/student-policy-gateway>). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit [Policy Central](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central) (<https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central>).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/study/getting-started/student-conduct>

Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit ask.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to help you improve your marks and take control of your study.

- [Getting help with your assignment](#)
- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

Student Services and Support

Students with a disability are encouraged to contact the [Disability Service](#) who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

If you are a Global MBA student contact globalmba.support@mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.